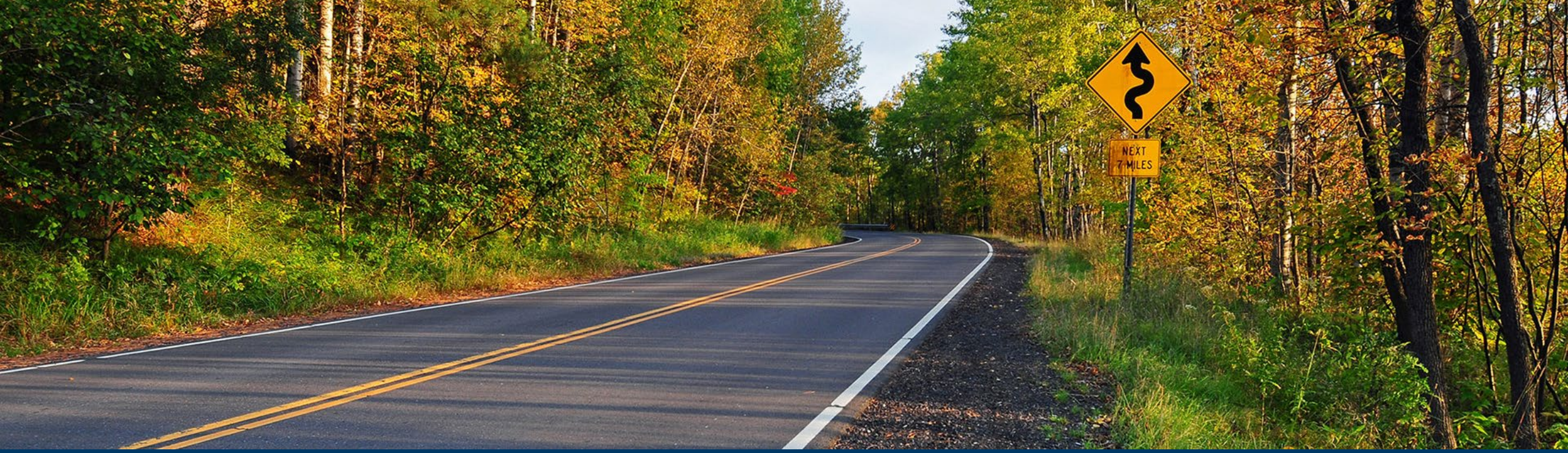


Assessing Transportation's Emissions Impact - Transportation Alliance

Maurice Roers, MnDOT's Office of Sustainability & Public Health

November 3, 2025

DEPARTMENT OF TRANSPORTATION

Overview

- Legislative Background
- GHG Assessment Procedure
- Offset Identification & Estimation
- Next Steps

Refresher on Legislative Background

DEPARTMENT OF TRANSPORTATION

mndot.gov

Background | Laws

Timeline of Minnesota's Climate Actions

2007 **Next Generation Energy Act** created goal to reduce Minnesota GHG emissions 80% by 2050

2008 Minnesota **Climate Change Advisory group** publishes final report recommending a comprehensive set of state-level climate polocies

2016 **Climate Solutions and Economic Opportunity report** identifies near-term emission reduction opportunities

2019 MnDOT publishes **Pathways to Decarbonizing Transportation in Minnesota**, outlining potential transportation actions to meet GHG goals

2020 **Sustainable Transportation Advisory Committee** established

2021 **Clean Cars Minnesota** rule adopted

2022 Minnesota's **Climate Action Framework** set goal to reduce GHG emissions by 50% by 2030 and achieve net-zero by 2050

Minnesota **Statewide Multimodal Transportation Plan** establishes transportation GHG reduction targets consistent with the Framework (80% reduction by 2040)

2023 **HF 2887** law creates new transportation funding sources for sustainable transportation, rebates and work groups

Next Generation Energy Act adopts goal to reduce GHG emissions by 30% by 2025, 50% by 2030 and net-zero emissions by 2050

Clean Transportation Fuel Standard Working Group and **GHG Emissions Impact Mitigation Working Group** are established and begin work

GHG emissions reduction performance targets & Impact Assessment + Offset

GHG emissions targets and project assessment (2023):

- Chapter 216 (2023): Set greenhouse gas emissions goal for Minnesota across all sectors
- Chapter 174 (2023): requires the commissioner of transportation to establish greenhouse gas emission reduction targets for the transportation sector
- Chapter 161 (2023): Requires MnDOT to assess and mitigate greenhouse gas emissions for highway expansion projects in 2025

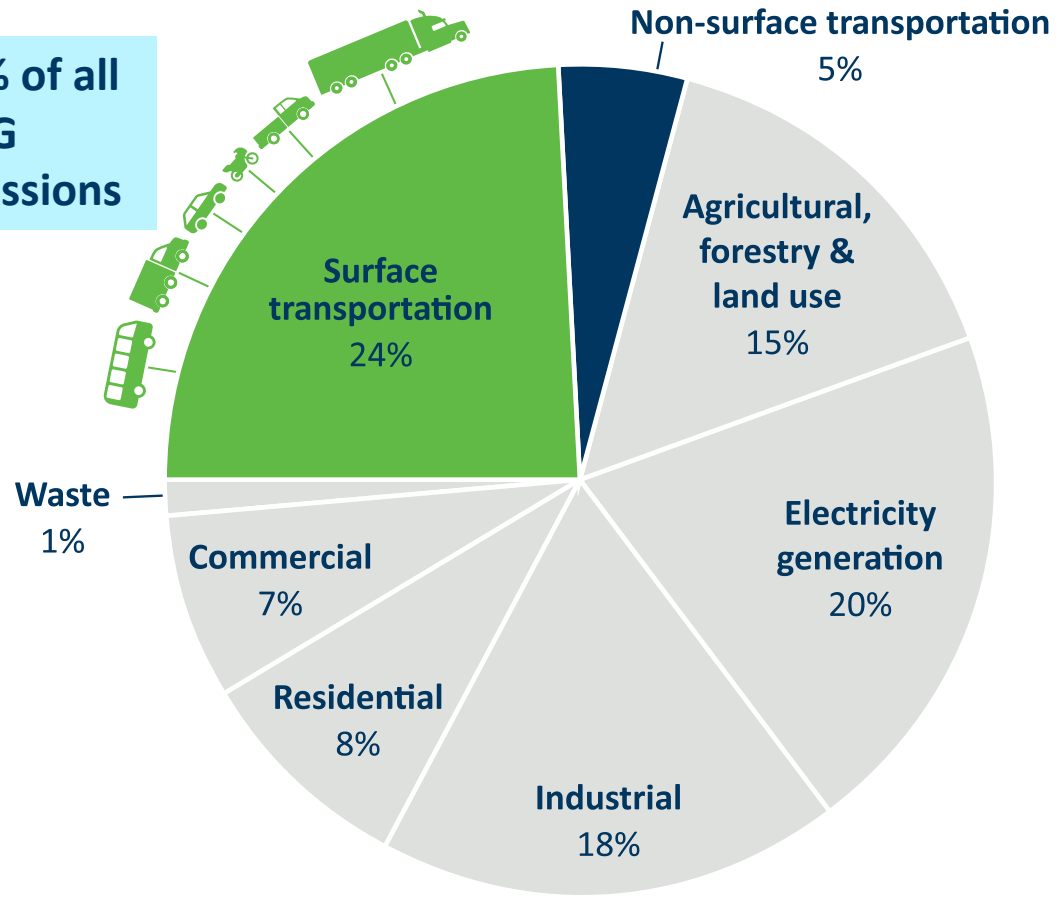
Portfolio / Program Assessment (2024):

- Chapter 127 (2024): Amends 161.178 to add a requirement of "assessing a portfolio or program of projects instead of on a project-by-project basis" by 2027

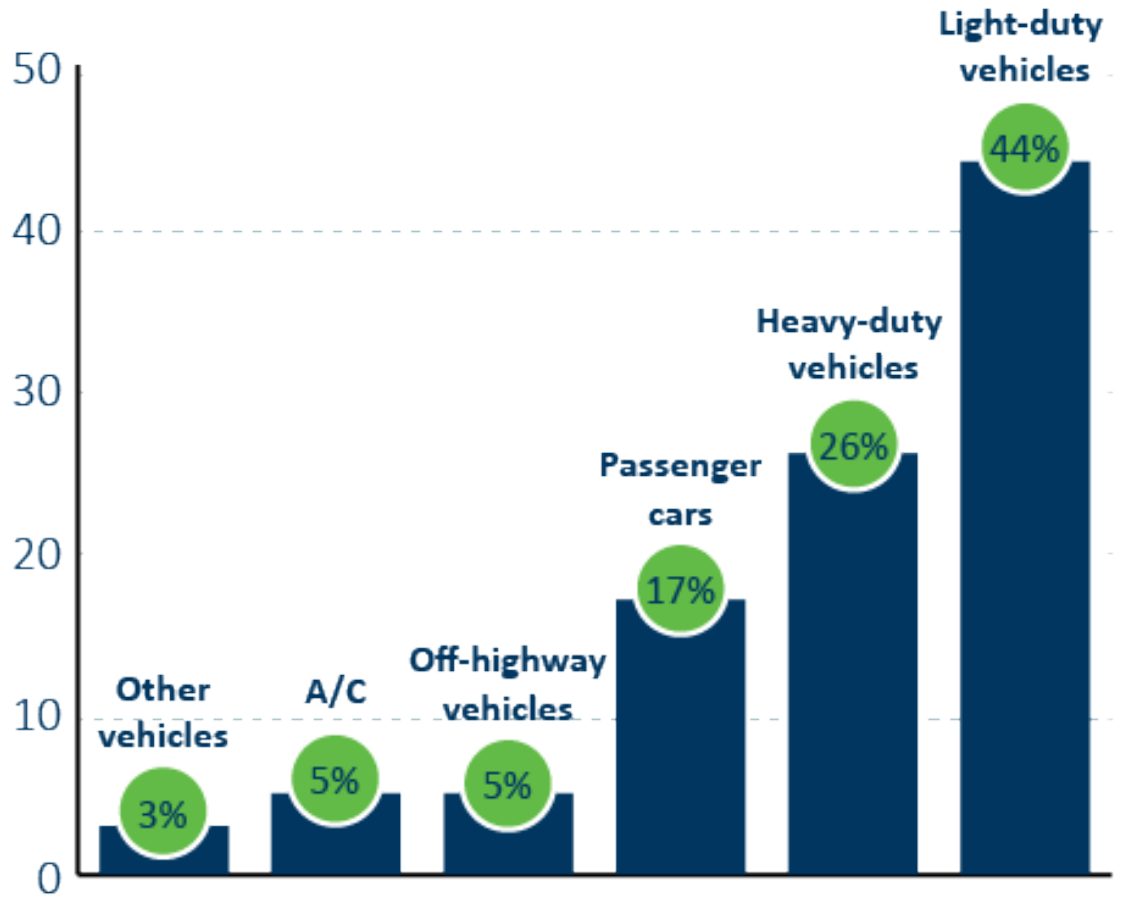
Background | Laws

ALL SECTOR BREAKDOWN(%)

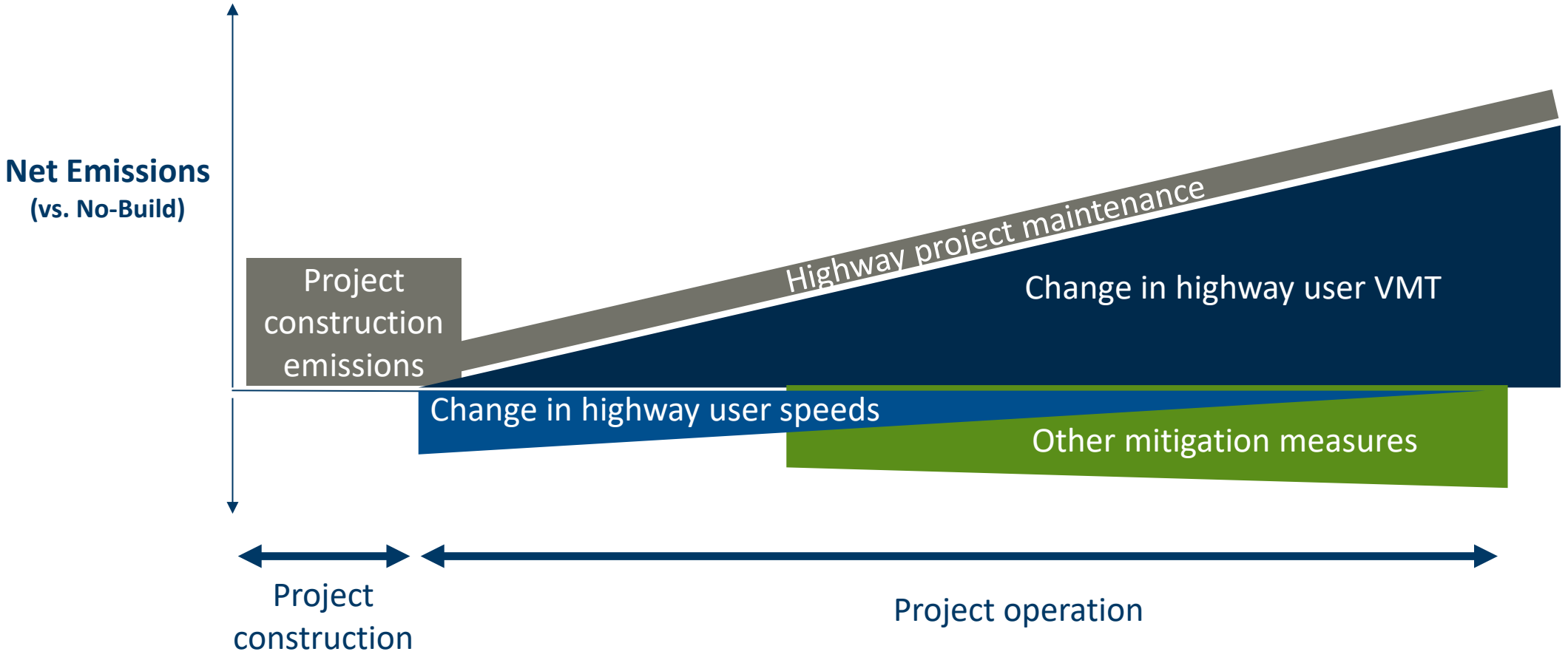
29% of all GHG emissions



SURFACE TRANSPORTATION BREAKDOWN (%)



Typical Emissions for Expansion Projects



Applying Research on Induced Vehicle Travel

GMM estimator results.

	(GMM-I)	(GMM-II)	(GMM-III)	(GMM-IV)
Lagged dependent variable	0.786	0.906	0.854	0.828
	(64.24)	(343.98)	(66.41)	(40.72)
Log urban lane-miles per capita				
Log income per capita				
State unemployment level				
Log gasoline price (2015)	−0.0237		−0.0135	−0.0149
	(-10.87)		(-4.78)	(-4.61)
Linear trend				−0.00164
				(-2.68)
Long-run induced dema				
External political instr				
Sargan overidentifyi				
– test statistic ~				
– degrees of free				
Second degree se				
– test statistic ~				

$$\ln\left(Q_j^{AR}\right) = A_0 + \rho_{R^{IH}}^{Q^{AR}} \ln\left(R_{ij}^{IH}\right) + A_1 X_{ij} + \epsilon_j,$$

Cervero and Hansen (2002)

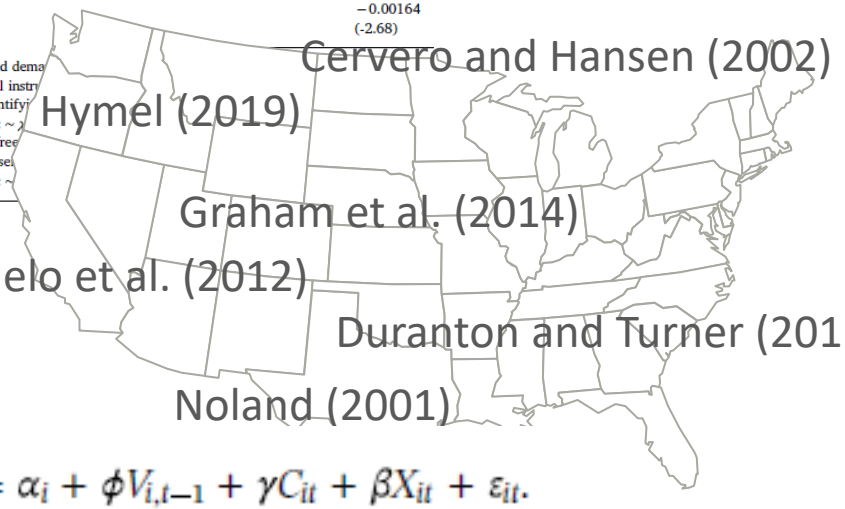
Hymel (2019)

Graham et al. (2014)

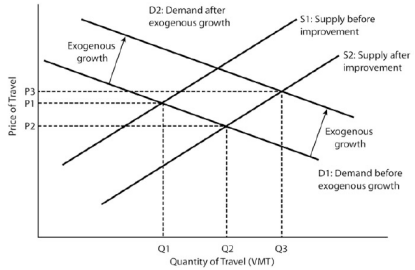
Melo et al. (2012)

Duranton and Turner (2011)

Noland (2001)



$$V_{it} = \alpha_i + \phi V_{i,t-1} + \gamma C_{it} + \beta X_{it} + \varepsilon_{it}.$$



- Strong evidence demonstrating induced vehicle travel
- Consistent findings regarding *average* induced VMT effects (i.e., elasticity value), considering many projects, large areas, long timeframes, etc.
- Minnesota's travel demand models also show a net increase in driving from capacity expansion

DEPARTMENT OF TRANSPORTATION

Development of the GHG Impact Assessment Procedure

How the Assessment Has Been Developed

Technical Advisory Committee

(established by the legislature)

MnDOT	**Jon Solberg**
Met Council	**Jonathan Ehrlich**
MPCA	**Kate Knuth**
County Rep	**Lyndon Robjent (**Carver County)
City Rep	**Marcus Culver** (Brooklyn Park)
U of M CTS	**Eric Lind**
Greater MN Rep	**Vicki Johnson** (St. Cloud APO)
Active Travel	**Mitzi Alex (**Toole Design)
National Expert	**Robert Noland (**Rutgers University)

How Expansion Projects Will Be Assessed

Step 1: Determine if a project is an “expansion”.

Step 2: Assess project for additional emissions and VMT generated over a 20-year period.

Step 3: If projects generates emissions or VMT, develop a plan to offset any increases.

Step #1: Determine if Project is an Expansion

- Is the project a major highway project?
  - total cost of at least $15M in the Metro District or
  - $5M in all other Districts

AND

- Does the project add new lanes over 2,500 feet or creates a new interchange?

Interchange at Hwy 10 & 23 in St. Cloud

Step #1: Determine if Project is an Expansion

Project types that are not considered expansions:

- ❑ Pavement rehabilitation (where no new lanes are added)
- ❑ Bridge replacement (where no new lanes are added)
- ❑ Intersection improvements (other than converting an at-grade intersection to a grade-separated crossing)
- ❑ Active transportation infrastructure
- ❑ Most systems management and operations projects

Interchange at Hwy 10 & 23 in St. Cloud

Step #2: Determine a Project's Emissions

Two Options

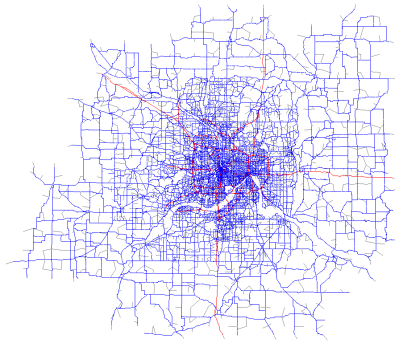
Elasticity Calculation

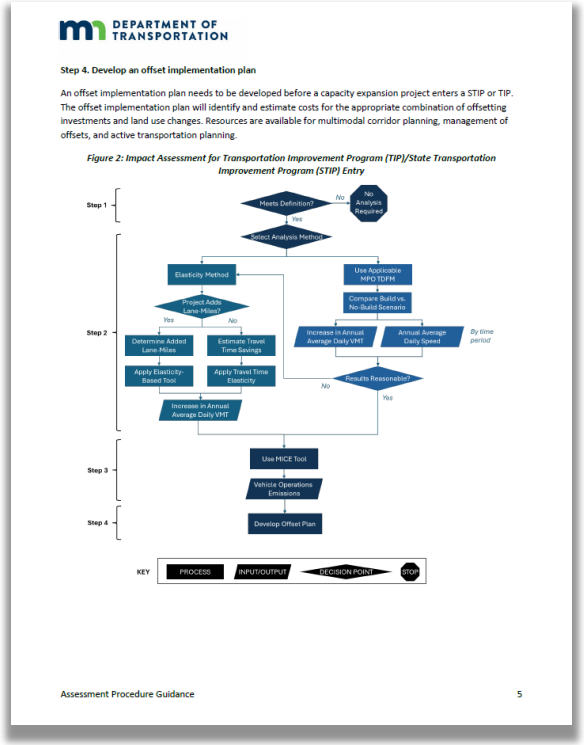
(Looking back)

$$\text{Build}_{\text{AddedVMT}} = \varepsilon \cdot \frac{\text{NewLM}}{\text{LM}} \cdot \text{VMT}$$

Travel Demand Forecast Model

(Looking forward)





DEPARTMENT OF TRANSPORTATION

Step 4. Develop an offset implementation plan

An offset implementation plan needs to be developed before a capacity expansion project enters a STIP or TIP. The offset implementation plan will identify and estimate costs for the appropriate combination of offsetting investments and land use changes. Resources are available for multimodal corridor planning, management of offsets, and active transportation planning.

Figure 2: Impact Assessment for Transportation Improvement Program (TIP)/State Transportation Improvement Program (STIP) Entry

Assessment Procedure Guidance 5

Assessment guidance:

Transportation Greenhouse Gas Emissions Impact Assessment - Sustainability and Public Health – MnDOT (https://www.dot.state.mn.us/sustainability/ghg-assessment.html)

Sensitivity Testing on Induced Travel

TDM capabilities + gaps from project testing

Travel demand model

Most capable

Route changes (diversion from other roads)

Destination changes (longer trips)

Mode changes (shift to auto)

Less capable

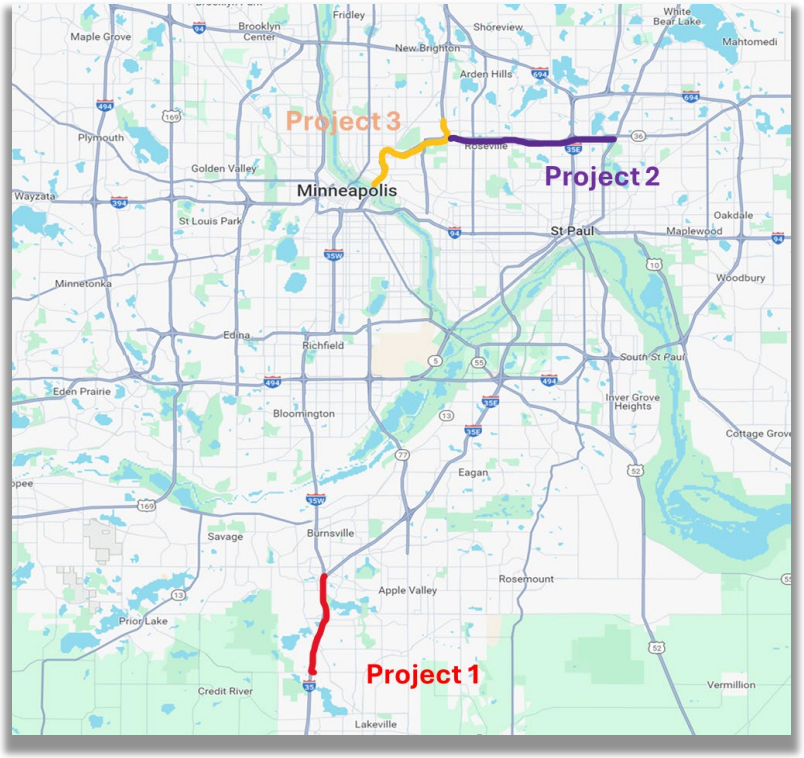
Newly generated trips (more frequent trips)

Not capable OR not a function of the TDM

More dispersed, auto-dependent land development

Faster regional growth / population in-migration

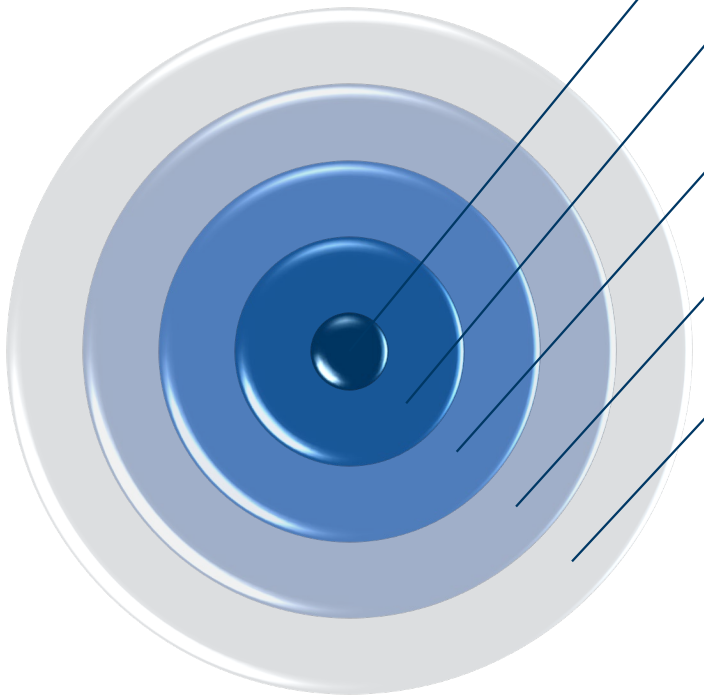
More freight movement (logistics changes)



Credit: HFTE Inc.

Step #3 – Identify Offsets to Emissions from a Project

Offsets | Proximity to project



Project

Community

Areas of persistent poverty or historically disadvantaged

Region

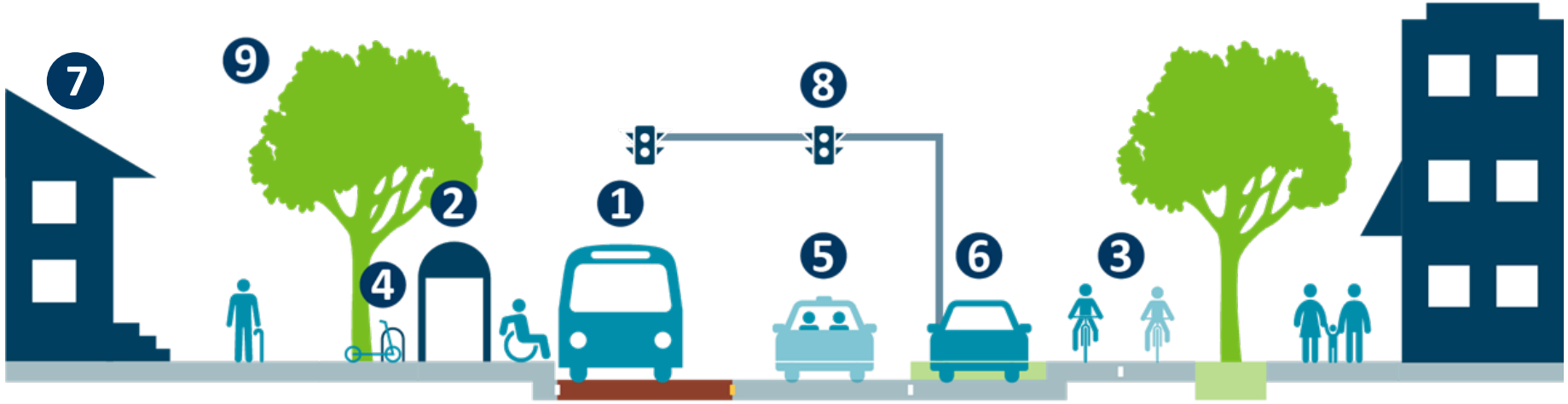
State

161.178 Subd. 5 Transportation Greenhouse Gas Emissions Impact Assessment

Areas of Persistent Poverty

Offsets

1. **Transit expansion**
   [bus routes, BRT, passenger rail]
2. **Transit service improvements**
   [increase transit service level, transit fare reduction]
3. **Active transportation infrastructure**
   [gap or standalone trail improvements, bike lane adds]
4. **Micromobility**
   [shared vehicle services]
5. **Transportation demand management**
   [vanpool and shared vehicle programs, telework programs, broadband access]
6. **Parking management**
   [policies to reduce or eliminate parking requirements, increased parking costs]
7. **Land use changes**
   [residential or other density increases, mixed-use development, transit-oriented development]
8. **Infrastructure improvements related to traffic operations**
   [roundabouts, reduced-conflict intersections]
9. **Natural systems**
   [prairie restoration, reforestation, wetland conservation, restorative ag practices]
10. **Land acquisition**
    [easements, restoration and enhancement for outdoor recreation system]



Carbon Emissions Tool (CET)

PROJECT TYPE: T2 – CONSTRUCT OR IMPROVE PEDESTRIAN/BICYCLE NETWORK

DIRECTIONS:

Enter project data needed within the "**INPUTS**" section below. Note that default values are available for many inputs, which are shown to the right and are pre-populated in the calculator. You may replace the default values in the calculation with your own data if you have project-specific data. Click the "Reset to Default" button if you would like to go back to using all default values.

The "**CONSTANTS & INTERIM CALCULATIONS**" section shows assumptions that cannot be changed or interim results that are calculated by the tool based on the project input data.

The "**RESULTS**" section shows the results of the carbon emissions calculations, both estimated emission reductions in year 1 and cumulative emission reductions over the duration of the project. Annual Results are listed on the right to assist in understanding the project's annual contribution to emissions reduction from the transportation

INPUTS — Reset to Default

Variables	*Value*	*Unit*	*Minnesota Region Default Value (For Reference Only)*
Year of project implementation	2027	-	
Length of new bicycle or pedestrian facility	6	miles	
Area type	Suburban		
Facility type	Shared Use Path		
Average length of vehicle trip replaced by biking	2.01	miles	2.01
Average length of vehicle trip replaced by walking	0.7	miles	0.70
Prior drive mode share of new bicyclists	60%	%	60%
Prior drive mode share of new pedestrians	40%	%	40%
Annual days in use of facility	214	days	214
Project lifetime	20	years	20

CONSTANTS & INTERIM CALCULATIONS

Variables	*Value*	
New daily bicycle trips	27	trips/mile
New daily pedestrian trips	32	trips/mile
Regional light-duty vehicle (LDV) fleet average GHG emission factor (Year 1)	334.01	g CO2e/mi
Regional light-duty vehicle (LDV) fleet average GHG emission factor (average of project lifetime)	262.49	g CO2e/mi

RESULTS

Variables	*Value*	*Unit*
Emissions reduction in year 1	17.81	CO2 e MT per year
Cumulative emissions reduction	279.88	CO2 e MT
VMT reduction in year 1	53,314	miles per year
Cumulative VMT reduction	1,066,285	miles

Annual Results

Year	VMT Reduction (mile/year)	GHG Reduction (CO2e MT/year)
2027	53,314	17.81
2028	53,314	17.20
2029	53,314	16.62
2030	53,314	16.08
2031	53,314	15.59
2032	53,314	15.14
2033	53,314	14.71
2034	53,314	14.32
2035	53,314	13.97
2036	53,314	13.65
2037	53,314	13.36
2038	53,314	13.08
2039	53,314	12.87
2040	53,314	12.68
2041	53,314	12.49
2042	53,314	12.32
2043	53,314	12.18
2044	53,314	12.05
2045	53,314	11.94
2046	53,314	11.83
Total	1,066,285	279.88

Required

Optional

Offsets

Carbon Emissions Tool (CET)

INPUTS

Reset to Default

	Variables	*Value*	*Unit*
Required	Year of project implementation	2027	-
	Length of new bicycle or pedestrian facility	6	miles
	Area type	Suburban	
	Facility type	Shared Use Path	
Optional	Average length of vehicle trip replaced by biking	2.01	miles
	Average length of vehicle trip replaced by walking	0.7	miles
	Prior drive mode share of new bicyclists	60%	%
	Prior drive mode share of new pedestrians	40%	%
	Annual days in use of facility	214	days
	Project lifetime	20	years

Carbon Emissions Tool (CET)

Offsets

RESULTS

Variables	*Value*	*Unit*
Emissions reduction in year 1	17.81	CO2 e MT per year
Cumulative emissions reduction	279.88	CO2 e MT
VMT reduction in year 1	53,314	miles per year
Cumulative VMT reduction	1,066,285	miles

Offsets – tools still to be developed

1. **Transit expansion**
   [bus routes, BRT, passenger rail]
2. **Transit service improvements**
   [increase transit service level, transit fare reduction]
3. **Active transportation infrastructure**
   [gap or standalone trail improvements, bike lane adds]
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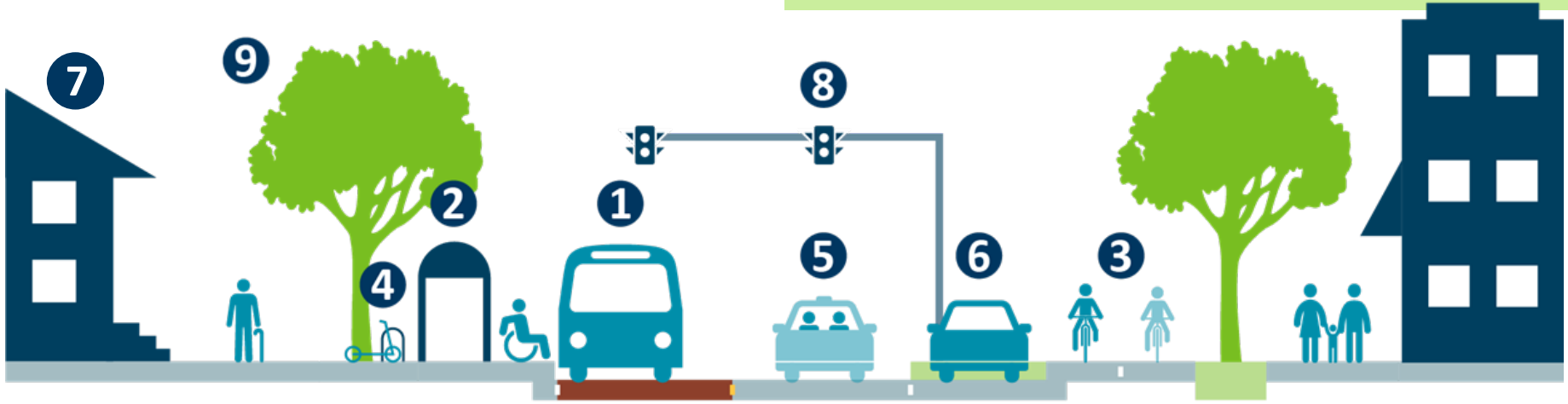
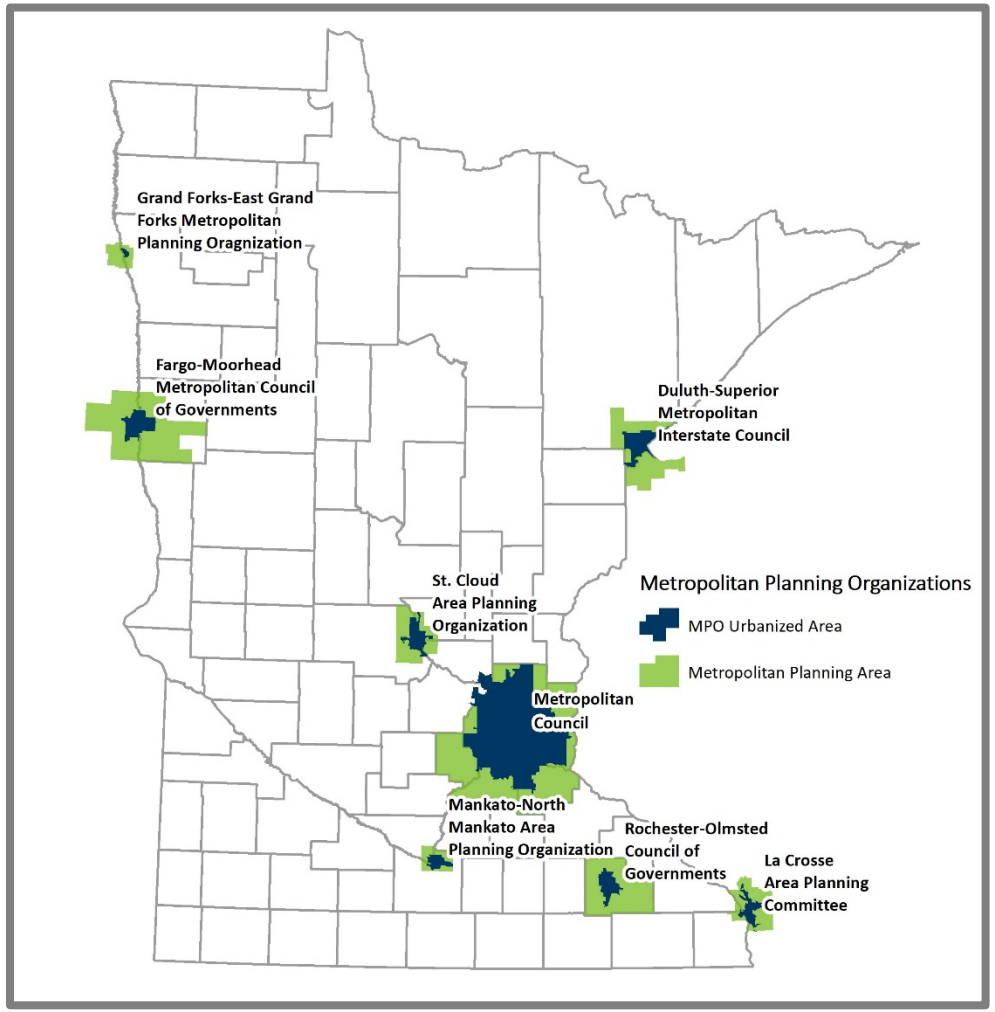


Who is responsible for expansion project assessments?

- **Within metropolitan planning areas:** the Metropolitan Planning Organization must assess prior to including a project in their Transportation Improvement Program (TIP)
- **Outside of metropolitan areas:** MnDOT must assess prior to including a project in the State Transportation Improvement Program (STIP)
- **<u>All assessments</u>** are reviewed and validated by the Technical Advisory Committee



Next Steps

MnDOT is working to develop…

- portfolio approach for assessments
- method for tracking and distributing offsets
- support for MPO's & ATP's on emissions reduction targets
- refined methods and research

Useful Resources

People

Maurice Roers
Planning & Policy Director

maurice.roers@state.mn.us

Anna Pierce
Carbon Reduction Program Coordinator

anna.m.pierce@state.mn.us

Guidance & Tools

- **Impact Assessment**

  https://www.dot.state.mn.us/sustainability/ghg-assessment.html

- **Carbon Emissions Tool (CET)**

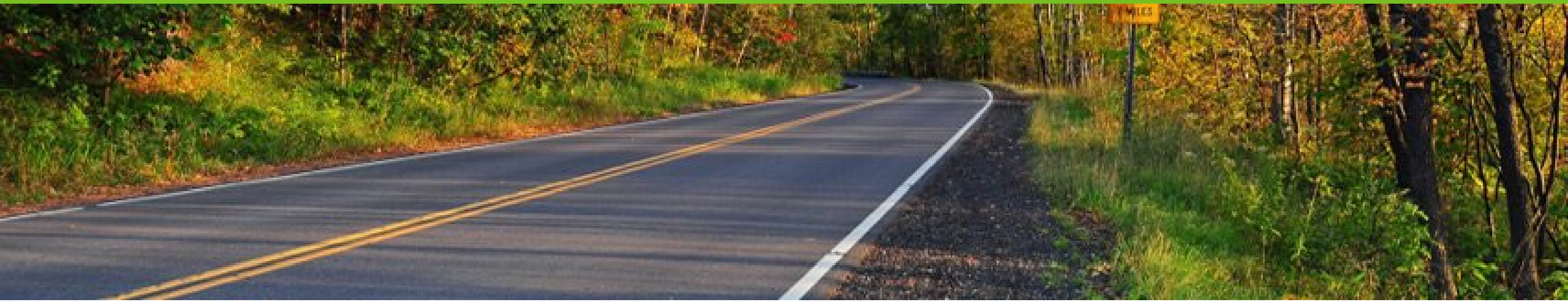
  https://dot.state.mn.us/carbon-reduction-program/carbon_emissions_tool_training.html

Information

- **Legislation**

  https://www.dot.state.mn.us/sustainability/ghg-relevant-statutes.html

Key Messages & Discussion



Plan early and collaborate with partners
Identify offsetting actions, create a balanced system.
Be proactive and seek assistance.

Thank You!

Maurice Roers

Office of Sustainability & Public Health

Mauice.Roers@state.mn.us